



THE COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF LABOR
DIVISION OF OCCUPATIONAL SAFETY
OCCUPATIONAL HYGIENE / INDOOR AIR QUALITY PROGRAM
www.mass.gov/dos/iaq

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HAZARD ALERT
**LEAD EXPOSURE AT INDOOR POLICE
FIRING RANGES IN MASSACHUSETTS**

Introduction

Potentially dangerous exposures to lead can occur in both indoor and outdoor police firing ranges. Range instructors and range cleaners are at greatest risk. This alert provides guidance for those who work in, use and maintain indoor firing ranges, to protect them from the hazards of lead.



How does lead affect the body?

Adults can be exposed to lead by breathing in lead dust or fumes or by ingesting lead dust. There are many symptoms or signs that suggest a problem with lead, but they can also be symptoms of other illnesses. It is also possible to have lead poisoning without noticing any symptoms. Therefore, if you work around lead, you should regularly see a doctor for blood testing, whether or not you are experiencing the following symptoms:

Early Signs and Symptoms of Lead Poisoning

Fatigue	Headache	Uneasy Stomach	Poor Appetite
Sleeplessness	Metallic Taste	Irritability or Nervousness	Reproductive Problems

Later Signs and Symptoms

Memory Problems	Weak Wrists/ankles	Weight Loss	Aches/Pain in Stomach
Nausea	Constipation	Kidney Problems	Muscle and Joint Pains

In addition, recent studies show that lead probably causes cancer. It is generally agreed that exposures to cancer causing agents should be kept as low as feasible.

What are the sources of lead exposure at a firing range?

In conventional ammunition, both the primer and the core of the bullet contain lead. Exposure to lead dust occurs during loading of ammunition, target shooting, gun cleaning and firing range maintenance. Inadequate or poorly designed ventilation, improper range cleaning procedures, eating drinking and smoking in an area where lead is used and lack of proper hygiene can all contribute to high lead exposures. Lead exposures occur in both indoor and outdoor ranges.

The Occupational Safety and Health Administration (OSHA) has set standards for maximum amounts of lead that can be in the indoor air as well as limits for the amount of lead that can be in the blood. Both air monitoring and blood monitoring may be necessary to determine the amount of lead that an employee is exposed to. In addition, wipe samples can indicate if contamination of surfaces may be a source of exposure.

You can take it home with you!

High levels of lead dust in ranges that are not properly designed, ventilated, or maintained can settle on the bodies, clothes and shoes of shooters and other range occupants. The dust can then be carried to their cars and homes, where it can be a hazard to their families. Young children are more sensitive to the effects of lead.

Do law enforcement personnel become lead-poisoned?

The following are examples of the many cases of over-exposure to lead at law enforcement firing ranges that have been documented in Massachusetts and elsewhere.

- The ventilation in a new firing range was blowing contaminated air toward the shooters. The maximum air lead levels exceeded twice the limit set by the U.S. Occupational Safety and Health Administration (OSHA).
- Air lead concentrations of police firearm instructors at an outdoor range were measured. When copper-jacketed ammunition was used, the lead levels were well below the OSHA limit; when non-jacketed bullets were used, the lead exposure was 4 times the OSHA limit.
- Blood lead levels and air lead concentrations were measured at an outdoor police firing range. When non-jacketed bullets were used, air concentrations were 9-10 times the OSHA limit. Range instructors had blood lead levels up to more than twice the recommended limit. After jacketed ammunition was introduced, both air and blood lead levels came down to safe levels.
- The blood leads of police trainees using an indoor range were measured before and after a 4-week period. Blood leads increased from an average of 7 mcg/dl (micrograms per deciliter) to over 40 mcg/dl. The National Institute of Occupational Safety and Health (NIOSH) recommends that blood lead levels remain below 25 mcg/dl. Air lead exposures were up to 60 times the OSHA limit.
- Three firearms instructors of a state corrections department had blood lead levels over 40 mcg/dl. Investigation revealed that shooting over an approximately 2-hour period resulted in air lead concentrations of 2–4 times the OSHA limit. Significant amounts of lead-contaminated dust were found in several range locations.

How can I minimize lead contamination at a firing range?

The best way to prevent lead exposures at firing ranges is to use ammunition that is free of lead components. Some ammunition is made with copper or nylon jackets that eliminate the hazard from the lead core of the bullet by enclosing the lead. However, to fully eliminate the lead hazard, the primer must also be lead-free. There is now ammunition on the market that is completely “lead-free” and has a non-lead core and a non-lead primer. When conventional ammunition is used, the following precautions must be taken.

Ventilation/Engineering Controls

- Provide an effective exhaust ventilation system, with a smooth airflow pattern that takes contaminated air from the breathing zone of the shooter and moves it down the firing range where it is effectively removed. The firing range should be designed in accordance with NIOSH and ACGIH (American Conference of Governmental Industrial Hygienists) guidelines. Poorly-designed ventilation systems and ranges with too many obstructions can be ineffective and cause

re-circulation of contaminated air to the area behind the firing line. Periodically measure the airflow to be sure that the ventilation system is operating as designed.

All indoor firing ranges should be under negative pressure with respect to surrounding areas. This means that there should be more air exhausted than supplied to the firing range so that any leakage of air would be into the range, and not out to other occupied areas of the building. In addition, it is critical that the exhaust from the firing range be independent from the general ventilation system and that it be properly filtered or exhausted to prevent contamination of other parts of the facility.

- Range instructors usually have the highest exposures to lead. In some instances, it may be desirable to provide range instructors with independently ventilated booth enclosures. These booths isolate the instructors from the lead exposure.
- Install escalator backstops, granulated rubber traps and their variations, which minimize dust levels and are easy to clean. Avoid the use of angled backstops with sand traps, which can generate a large amount of airborne lead dust and require frequent cleaning.

Housekeeping

- Ranges should be cleaned daily or after each use to minimize the buildup of lead. To clean the range, use an industrial grade vacuum cleaner equipped with a high-efficiency (HEPA) filter. HEPA filters trap fine particles of lead. Lead dust is not trapped effectively by other types of vacuum filters. **NEVER DRY SWEEP RANGES.**

Wet methods, using any household detergent, can also be used to minimize lead dust. Even countertops, gun cleaning trays and target rails can be contaminated with lead. Proper cleaning or disposal of contaminated mops and cloths must be considered. Proper personal protective equipment such as respirators and protective clothing is needed for range cleaners.

Training

- Shooters, instructors and maintenance staff must all be trained in the hazards of lead and the precautions needed to protect themselves. Training should be given before employees are exposed to lead, and then annually. Information that may be useful in training is available in the appendixes of the OSHA Lead Standard (*see additional information at end of this bulletin*).

Personal Protective Equipment

- During range cleaning, a HEPA (N100)-filtered respirator, disposable protective clothing and shoe coverings are recommended. The respirator must be properly fitted and a medical screening for respirator use should be done (*see additional information at end of this bulletin*).
- Hearing and eye protection should be used during all shooting activities.

Personal Hygiene

- Showers, washing facilities and changing rooms should be provided and used. Hands, and faces must be washed after shooting. Range instructors and range cleaners should shower and wash their hair at the end of their shift. The changing room should have separate lockers for contaminated protective clothing and street clothes. Contaminated clothing and shoes should be properly disposed of or cleaned. Any lead-contaminated clothing should be washed separate from other laundry items.
- Eating, drinking and smoking must be prohibited in any area that could be contaminated with lead.

How can I tell how much lead I am exposed to?

Blood Lead and Medical Monitoring

- Police officers and others who are frequently exposed to lead must have periodic medical exams and blood lead and other medical testing. At a minimum, range instructors and range cleaners should have their blood tested once every 6 months or after qualification periods or periods of high exposures. One National Institute of Occupational Safety and Health (NIOSH) document recommends that blood testing be done on every person who works in or uses the range more than 3 hours per month. NIOSH recommends that blood lead levels be kept below 25 micrograms per deciliter (mcg/dl). *(The Division of Occupational Safety is currently making blood lead testing available free of charge to range instructors and range cleaners. See information at end of this bulletin.)*

Air Monitoring

- In addition to testing the range ventilation, air monitoring for lead exposures should be done periodically to determine the effectiveness of the ventilation and other controls. OSHA has set a maximum 8-hour exposure limit of 50 micrograms of lead per cubic meter of air, (ug/M3) with an action level of 30 ug/M3. The Massachusetts DOS, your insurance company or a private industrial hygiene firm can provide such testing.

Wipe Sampling

- Wipe samples of surfaces can sometimes be useful in assessing the extent of contamination. While there are no recognized standards for the amount of lead that can be on surfaces in the workplace, there are some surfaces where there should be NO lead contamination. For example, there should be no lead present on surfaces where employees eat, drink or smoke. The inside surfaces of respirators should also be free from lead contamination. Wipe samples can be taken by the Massachusetts DOS, your insurance company or a private industrial hygiene firm.

Who regulates lead exposure in police department firing ranges in Massachusetts?

While private sector employees are covered by OSHA Standards, public sector employees in Massachusetts are not. The Division of Occupational Safety, in accordance with MGL Chapter 149 section 6, is charged with inspecting workplaces in Massachusetts and determining what procedures and practices are required to protect workers. As a matter of policy, our office references OSHA regulations, as well as other consensus standards, when we determine whether proper procedures are being followed to protect workers. **Our office recommends that the OSHA Lead Standard for general industry (29 CFR 1910.1025) be followed as a minimum.** By following the OSHA standard you will be considered to be in compliance with Chapter 149, section 6.

Where can I get more information and assistance?

- The OSHA Lead Standard (29 CFR 1910.1025) can be found on www.osha.gov
- The National Institute for Occupational Safety and Health (NIOSH) web page is www.cdc.gov/niosh.
- The Division of Occupational Safety web page is www.state.ma.us/dos
- The **Division of Occupational Safety** (DOS) offers free on-site consultations. The DOS consultant will provide you with written materials, review the procedures that you will need to implement, provide ventilation testing and air monitoring as needed, and issue a detailed written report. There are no fees for this service, nor are there fines or penalties associated with the initial discovery of non-compliance. However, you will be required to comply with the more critical recommendations made by the consultant.
- For information on environmental lead management for outdoor firing ranges, call or write to: National Shooting Sports Foundation, 11 Mile Hill Rd., Newtown, CT 06470; tel.(203) 426-1320 or www.rangeinfo.org; or contact the Massachusetts Department of Environmental Protection's Lead Shot Initiative at (617) 348-4056 or www.state.ma.us/dep/files/pbshot.htm.

For Additional Information (Please photocopy this form and send or fax to the address below)

OSHA Lead Standard and Appendixes ☐

NIOSH Health Hazard Evaluations in Firing Ranges ☐

Respirator Fit Testing and Medical Screening Information ☐

Please contact me to arrange an on-site consultation at my facility ☐

Name _____ Title _____

Address _____ City/Town _____ Zip _____

Tel. Number () _____

Mass. Division of Occupational Safety
Occupational Hygiene/Indoor Air Quality Program
1001 Watertown Street, West Newton, MA 02465 ;Tel. (617) 969-7177; Fax (617) 727-4581

Blood Lead Testing Available through Division of Occupational Safety

As part of its initiative to reduce lead exposure at Massachusetts police departments, the Division of Occupational Safety is offering blood lead tests, ***free of charge to firing range instructors and firing range maintenance personnel***. A licensed physician or other healthcare provider acting under the direct supervision of a licensed physician must order the blood lead test. The order must include the employee's name as well as the employer's name and address on the physician's letterhead. Once the order is obtained, you may set up an appointment and bring this order to the DOS laboratory to have your blood drawn and tested for lead. Alternatively, you may send drawn blood in a green-top tube along with the physician's order directly to the DOS lab for free analysis. Lead results are sent to both the physician and to you. To obtain more details and or to set up an appointment for this service, contact the DOS laboratory at (617) 969-7177.

Some individuals may wish to have their blood tested through their primary care physician or through an occupational health service. For a list of health care facilities that have physicians that are board-certified in occupational medicine, contact the DOS lead registry at the same phone number.